

1.28: SOLAR/1034-79/02

Alpha 1214302

SOLAR/1034-79/02



Monthly Performance Report

ALPHA CONSTRUCTION CO.

FEBRUARY 1979



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

ALPHA CONSTRUCTION COMPANY

FEBRUARY 1979

I. SYSTEM DESCRIPTION

The Alpha Construction Company site is a single-family residence in Canton, Ohio. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 428 square feet. The array faces south at an angle of 37 degrees to the horizontal. Air is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 510-cubic-foot bin containing 50,100 pounds of rock. The bin has concrete block walls and polyurethane insulation. Preheated city water is stored in an 80-gallon preheat storage tank and supplied, on demand, to a conventional 52-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat pump in the air-handling unit provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has four modes of solar operation.

Mode 1 - Collector-to-Space Heating: This mode activates when the collector is operating, a space heating demand exists, and the plenum temperature at the top of storage is above the minimum value suitable for supplying heat to the house. Heated air is circulated through the house by the air-handling unit before being returned to the collector.

Mode 2 - Collector-to-Storage: This mode activates when the collector is operating and there is either no demand for space heating or the plenum temperature at the top of storage is below the minimum value for supplying heat to the house.

Mode 3 - Storage-to-Space Heating: This mode activates when there is a demand for space heating, and the plenum temperature at the top of storage is above the minimum value for supplying heat to the house. The fan in the air-handling unit draws air from the bin, circulating it through the house and back to storage.

Mode 4 - Domestic Water Preheating: This mode activates when the temperature at the top of the collector indicates a minimum value for hot water heating, which must be above the plenum temperature at the bottom of storage.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was unoccupied during the month of February; however the solar energy system operated continuously during the month. Solar energy satisfied

- 1001 COLLECTOR PLANE TOTAL INSOLATION
- ▶ T001 OUTDOOR TEMPERATURE
- ▶ T600 INDOOR TEMPERATURE

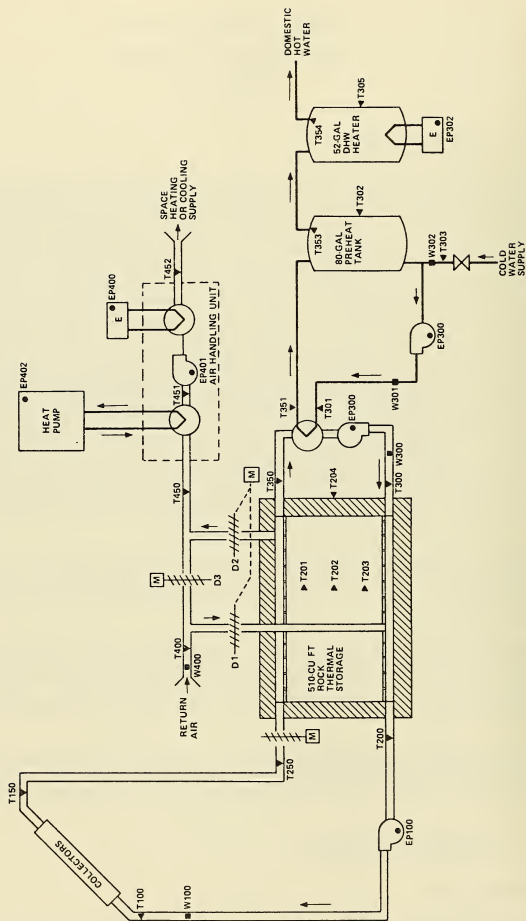


Figure 1. ALPHA CONSTRUCTION CO. SOLAR ENERGY SYSTEM SCHEMATIC

1 percent of the space heating requirements. The solar energy system incurred an electrical energy expense of 0.25 million Btu.

WEATHER CONDITIONS

During the month total incident solar energy on the collector array was 9.6 million Btu for a daily average of 799 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during February of 947 Btu per square foot for a south-facing plane with a tilt of 37 degrees to the horizontal. The average ambient temperature during February was 18°F as compared with the long-term average for February of 28°F. The number of heating degree-days for the month (based on a 65°F reference) was 1327, as compared with the long-term average of 1044.

THERMAL PERFORMANCE

System - During February the solar energy system performed somewhat poorer than expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as inputs. Solar energy collected was 2.5 million Btu versus an estimated 3.2 million Btu. Solar energy used by the system was estimated by assuming that all energy collected would be applied to the load. Actual solar energy used was 0.17 million Btu. System total solar fraction was 1 percent versus an estimated 31 percent.

Collector - The total incident solar radiation on the collector array for the month of February was 9.6 million Btu. During the period the collector loop was operating, the total insolation amounted to 7.5 million Btu. The total collected solar energy for the month of February was 2.5 million Btu, resulting in a collector array efficiency of 26 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 2.4 million Btu, while solar energy delivered from the collector array directly to the loads amounted to 0.072 million Btu. Energy loss during transfer from the collector array to storage and loads was 0.024 million Btu. This loss represented 1 percent of the energy collected. Operating energy required by the collector loop was 0.17 million Btu.

Storage - Solar energy delivered to storage was 2.4 million Btu. There were 0.093 million Btu delivered from storage to the space heating subsystem. Energy loss from storage was 1.9 million Btu. This loss represented 81 percent of the energy delivered to storage. The storage efficiency was 19 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 71°F.

DHW Load - Because the home was unoccupied in February there was no requirement for hot water. A total of 0.072 million Btu of solar energy was used to heat the water in the preheat tank. The DHW subsystem consumed a total of 0.11 million Btu of operating energy resulting in an energy expense of 0.11 million Btu. An additional 0.31 million Btu of auxiliary electrical energy

was used by the hot water tank to maintain the temperature. The average temperature of the water in the DHW tank was 120°F.

Space Heating Load - The space heating requirement for the unoccupied home during February was 9.3 million Btu. The solar energy system provided 0.093 million Btu or 1 percent of this requirement. The remaining load of 9.2 million Btu was satisfied by an auxiliary electrical heat pump and an electrical heating element at an electrical consumption of 5.3 million Btu. The space heating subsystem consumed an additional 1.7 million Btu of operating energy. A net electrical energy savings of 0.030 million Btu was obtained from the solar portion of the space heating subsystem.

OBSERVATIONS

The solar energy site was unoccupied during the month of February and presented a minimum space heating load due to a thermostat set at 57°F. The daily average insolation was slightly lower than is expected in February, while the average temperature was 10°F colder than the long-term average. On 10 days the total daily insolation was greater than 1000 Btu per square foot. On only five days, however, was the temperature in storage sufficient to act as a source for space heating and then only minimally. Unmeasurable energy escaped into the conditioned space and outside environment causing storage to lose most of the energy collected during the month. The 1.9 million Btu lost from storage, if added to the measured space heating load of 9.3 million Btu, exceeds the estimated space heating load of 10.1 million Btu (based on UA value of the house).

The DHW preheat subsystem expended more operating energy than the amount of solar energy transferred to the DHW preheat tank; this pattern has been consistent throughout the heating season. The lack of a hot water load due to the unoccupied home may partially account for this.

The configuration of the DHW subsystem preheat loop permits energy transfer to the preheat tank only during times when collection is occurring. A separate air blower is required by this subsystem, adding significantly to the operating energy costs. During periods of heating from storage, an induced air flow occurs through the DHW preheat loop. Some of the unmeasurable energy loss from storage may be escaping through this air path. During the cooling season the storage subsystem must be operated to allow operation of the DHW preheat subsystem. Energy not utilized by the DHW subsystem is collected in storage. Energy losses from storage to the conditioned space add to the cooling load, reducing any savings obtained by the DHW subsystem. Based upon the apparent ineffectiveness during the heating season and the operating costs during the summer, it may be worth reconfiguring or deactivating the DHW subsystem at this site.

ENERGY SAVINGS

The solar energy system incurred a total electrical energy expense of 0.25 million Btu. The space heating subsystem provided a savings of 0.03 million Btu but this was eliminated due to the expense of operating the DHW subsystem (0.11 million Btu) and the collection subsystem (0.17 million Btu).

III. ACTION STATUS

Boeing conducted a preliminary air-mapping survey in October which revealed significant leaks in the energy collection and storage subsystems. Sealing the accessible leaks would only provide minimal improvement.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1034-79/02

SITE/SYSTEM DESCRIPTION: THE SOLAR ENERGY SYSTEM PROVIDES FOR SPACE HEATING OF A SINGLE FAMILY DWELLING. THE SYSTEM ALSO PROVIDES ENERGY TO AN 80 GALLON HOT WATER PREHEAT TANK. STORAGE IS 510 CUBIC FEET OF GRAVEL. A HEAT PUMP AND ELECTRIC STRIP HEATERS PROVIDE AUXILIARY SPACE HEATING.

GENERAL SITE DATA:
INCIDENT SOLAR ENERGY

9.586 MILLION BTU
22376 RTU/SQ. FT.
2.459 MILLION BTU
5741 RTU/SQ. FT.
18 DEGREES F.
57 DEGREES F.
0.02 MILLION BTU
1.463 MILLION BTU
9.983 MILLION BTU

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
ECS3 SOLAR CONVERSION EFFICIENCY
ECS3 OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING
LOAD	0.000	9.290	N.A.
SOLAR FRACTION USED	13	1	N.A.
SOLAR ENERGY USED	0.072	0.093	N.A.
OPERATING ENERGY	0.113	1.664	N.A.
AUX. THERMAL ENERGY	0.305	4.592	N.A.
AUX. ELECTRIC FUEL	N.A.	5.276	N.A.
AUX. FOSSIL FUEL	-0.113	0.030	N.A.
ELECTRICAL SAVINGS	N.A.	N.A.	N.A.
FCSSIL SAVINGS			

SYSTEM PERFORMANCE FACTOR: 0.371

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1034-79/02

SITE/SYSTEM DESCRIPTION:
THE SOLAR ENERGY SYSTEM PROVIDES FOR SPACE HEATING OF A SINGLE FAMILY DWELLING. THE SYSTEM ALSO PROVIDES ENERGY TO AN 80 GALLON HOT WATER PREHEAT TANK. STORAGE IS 510 CUBIC FEET OF GRAVEL. A HEAT PUMP AND ELECTRIC STRIP HEATERS PROVIDE AUXILIARY SPACE HEATING.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	10.113	GIGA JOULES
COLLECTED SOLAR ENERGY	2542.99	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	25.95	GIGA JOULES
AVERAGE BUILDING TEMPERATURE	65.93	KJ/SQ.M.
EXCESS SOLAR CONVERSION EFFICIENCY	1.7	DEGREES C
LOSS OPERATING ENERGY	0.92	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.175	GIGA JOULES
TOTAL ENERGY CONSUMED	12.050	GIGA JOULES
	13.532	GIGA JOULES

SUBSYSTEM SUMMARY:

LOAD	HOT	WATER	HEATING	COOLING
SOLAR FRACTION USED	0.000	9.801	N.A.	N.A.
SOLAR ENERGY USED	13	1	N.A.	N.A.
OPERATING ENERGY	0.076	0.098	N.A.	N.A.
AUX. THERMAL ENG	0.119	1.756	N.A.	N.A.
AUX. ELECTRIC FUEL	0.322	4.845	N.A.	N.A.
AUX. FOSIL FUEL	0.322	5.566	N.A.	N.A.
ELECTRICAL SAVINGS	N.A.	N.A.	N.A.	N.A.
FOSIL SAVINGS	-0.119	0.032	N.A.	N.A.
	N.A.	N.A.	N.A.	N.A.
		0.371		

SYSTEM PERFORMANCE FACTOR:

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1034-7c/02

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REFLECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.145	15	0.000	N O T	0.002	N O T	0.000
2	0.344	11	0.005		0.011		0.013
3	0.219	20	0.003		0.019		0.008
4	0.907	16	0.007		0.011		0.004
5	1.028	28	0.005		0.012		0.030
6	0.662	23	0.020		0.000		0.000
7	0.111	21	0.000		0.010		0.004
8	0.686	11	0.003		0.011		0.007
9	0.588	13	0.005		0.019		0.003
10	0.640	15	0.002		0.010		0.066
11	0.060	15	0.000		0.000		0.000
12	0.087	15	0.000		0.000		0.000
13	0.055	22	0.000		0.007		0.004
14	0.231	11	0.001		0.007		0.015
15	0.531	-	0.008		0.013		0.001
16	0.171	9	0.000		0.001		0.001
17	0.289	13	0.000		0.013		0.078
18	0.260	23	0.023		0.009		0.423
19	0.238	35	-		0.000		-
20	0.104	34	0.000		0.001		0.001
21	0.092	44	0.000		0.001		0.000
22	0.043	36	0.000		0.000		0.000
23	0.013	32	0.000		0.000		0.000
24	0.007	27	0.007		0.007		0.013
25	0.528	29	0.001		0.013		0.015
26	0.708	32	0.011		0.013		0.015
27							
28							
SUM	9.586	-	0.165	N.A.	0.166	N.A.	-
AVG	0.342	18	0.006	N.A.	0.006	N.A.	0.017
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1034-79/02

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.145	0.037	0.006	19	0.042
2	0.344	0.310	0.121	20	0.353
3	0.219	0.125	0.122	21	0.212
4	0.907	0.849	0.220	18	0.213
5	1.028	0.535	0.121	10*	0.185
6	0.662	0.000	0.000	28	0.000
7	0.111	0.543	0.135	15	0.197
8	0.686	0.582	0.163	12	0.235
9	0.696	0.493	0.119	10	0.202
10	0.588	0.587	0.176	15	0.271
11	0.649	0.000	0.000	18	0.000
12	0.060	0.000	0.000	14	0.000
13	0.089	0.000	0.000	11	0.000
14	0.067	0.000	0.000	12	0.000
15	0.055	0.000	0.000	16	0.000
16	0.231	0.165	0.056	26	0.242
17	0.531	0.476	0.230	16	0.433
18	0.171	0.033	0.006	12	0.035
19	0.271	0.185	0.059	23	0.215
20	0.289	0.274	0.263	20	0.912
21	0.680	0.107	0.000	40	0.000
22	0.238	0.024	0.062	46	0.259
23	0.104	0.007	0.002	46	0.022
24	0.092	0.000	0.000	35	0.000
25	0.043	0.000	0.000	28	0.000
26	0.013	0.009	0.000	35	0.000
27	0.529	0.345	0.124	42	0.236
28	0.708	0.671	0.261	42	0.369
SUM	9.586	7.464	2.459	-	-
AVG	0.342	0.267	0.088	23	0.257
NBSID	Q001	-	Q100	-	N100

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT STORAGE PERFORMANCE

SOLAR/1034-79/02

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.005	0.000	-0.016	53	-3.047
2	0.121	0.000	0.078	59	0.687
3	0.121	0.000	0.078	64	0.641
4	0.188	0.000	0.119	73	0.936
5	0.208	0.000	0.083	81	0.398
6	0.112	0.017	-0.061	84	-0.386
7	0.000	0.000	-0.063	77	1.000
8	0.131	0.000	0.054	77	0.414
9	0.153	0.000	0.019	80	0.127
10	0.111	0.000	-0.069	80	-0.000
11	0.165	0.037	-0.047	73	-0.196
12	0.000	0.000	-0.040	69	1.000
13	0.000	0.000	-0.033	66	1.000
14	0.000	0.000	-0.028	63	1.000
15	0.058	0.000	-0.003	61	-0.048
16	0.222	0.000	-0.146	68	-0.655
17	0.057	0.000	-0.037	71	-0.473
18	0.250	0.011	-0.004	77	0.487
19	0.000	0.015	-0.135	73	0.000
20	0.063	0.000	-0.046	71	-0.737
21	0.002	0.000	-0.030	72	-3.497
22	0.000	0.000	-0.024	70	-14.158
23	0.000	0.000	-0.019	68	1.000
24	0.000	0.000	-0.021	66	1.000
25	0.118	0.000	-0.072	68	0.610
26	0.253	0.003	0.170	81	0.680
27					
28					
SUM	2.363	0.093	0.366	-	-
AVG	0.084	0.003	0.013	71	0.194
NBS ID	Q2C0	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979
SOLAR/1034-79/02

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT SAVINGS MILLION BTU	FOSSIL SAVINGS MILLION BTU	SUP. WAT. TEMP. DEG F	HOT WAT. TEMP. DEG F	HOT WATER USED GAL
1	0.000	50	0.005	0.006	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
2	0.000	0	0.005	0.007	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
3	0.000	17	0.007	0.009	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
4	0.000	0	0.005	0.006	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
5	0.000	0	0.003	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
6	0.000	0	0.003	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
7	0.000	0	0.003	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
8	0.000	0	0.002	0.007	0.012	0.012	0.000	0.000	NOT APPLICABLE	62	118	0
9	0.000	0	0.006	0.008	0.012	0.012	0.000	0.000	NOT APPLICABLE	62	118	0
10	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
11	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
12	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
13	0.000	0	0.001	0.003	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
14	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
15	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
16	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
17	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
18	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
19	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
20	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
21	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
22	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
23	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
24	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
25	0.000	0	0.000	0.000	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
26	0.000	0	0.000	0.000	0.010	0.010	0.000	0.000	NOT APPLICABLE	62	118	0
27	0.000	0	0.007	0.006	0.011	0.011	0.000	0.000	NOT APPLICABLE	62	118	0
28	0.000	0	0.008	0.010	0.010	0.010	0.000	0.010	NOT APPLICABLE	62	118	0
SUM	0.000	-	0.072	0.113	0.305	0.305	0.305	0.113	N.A.	-	-	0
AVG	0.000	13	0.003	0.004	0.011	0.011	0.011	0.004	N.A.	62	120	0
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N30A

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SOLAR/1034-79/02

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

DAY CF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT SAVINGS MILLION BTU	FOSSIL SAVINGS MILLION BTU	BLDG TEMP DEG.	AMR TEMP DEG.
1	0.351	0	0.000	0.077	0.136	0.194	NOT	0.000	NOT	57	57
2	0.372	0	0.000	0.066	0.119	0.140	NOT	0.000	NOT	57	57
3	0.280	0	0.000	0.058	0.116	0.134	NOT	0.000	NOT	57	57
4	0.318	0	0.000	0.054	0.112	0.128	NOT	0.000	NOT	57	57
5	0.428	0.4	0.007	0.065	0.244	0.267	NOT	0.006	NOT	57	57
6	0.276	0	0.000	0.062	0.081	0.111	NOT	0.000	NOT	57	57
7	0.327	0	0.000	0.067	0.146	0.112	NOT	0.000	NOT	57	57
8	0.377	0	0.000	0.076	0.183	0.311	NOT	0.000	NOT	57	57
9	0.517	0.9	0.037	0.082	0.312	0.315	NOT	0.000	NOT	57	57
10	0.426	0	0.000	0.080	0.257	0.227	NOT	0.012	NOT	57	57
11	0.431	0	0.000	0.088	0.191	0.232	NOT	0.000	NOT	57	57
12	0.513	0	0.000	0.087	0.292	0.348	NOT	0.000	NOT	57	57
13	0.498	0	0.000	0.088	0.263	0.234	NOT	0.000	NOT	57	57
14	0.499	0	0.000	0.066	0.097	0.112	NOT	0.000	NOT	57	57
15	0.242	0	0.000	0.080	0.215	0.247	NOT	0.000	NOT	57	57
16	0.568	0	0.000	0.075	0.385	0.328	NOT	0.000	NOT	57	57
17	0.513	0	0.000	0.084	0.292	0.311	NOT	0.000	NOT	57	57
18	0.273	0	0.000	0.064	0.262	0.207	NOT	0.000	NOT	57	57
19	0.128	2	0.045	0.034	0.113	0.119	NOT	0.008	NOT	57	57
20	0.154	0	0.000	0.022	0.032	0.043	NOT	0.000	NOT	57	57
21	0.196	0	0.000	0.010	0.016	0.039	NOT	0.000	NOT	57	57
22	0.134	0	0.000	0.050	0.127	0.138	NOT	0.000	NOT	57	57
23	0.296	0	0.000	0.071	0.113	0.148	NOT	0.000	NOT	57	57
24	0.337	0	0.000	0.032	0.048	0.104	NOT	0.000	NOT	57	57
25	0.151	0	0.000	0.032	0.045	0.049	NOT	0.000	NOT	57	57
26	0.141	2	0.003	0.032	0.045	0.049	NOT	0.000	NOT	57	57
27	0.141	0	0.000	0.032	0.045	0.049	NOT	0.000	NOT	57	57
28	0.141	0	0.000	0.032	0.045	0.049	NOT	0.000	NOT	57	57
SUM	9.290	-	0.093	1.664	4.592	5.276	N.A.	0.030	N.A.	-	-
AVG	0.332	1	0.003	0.059	0.164	0.188	N.A.	0.001	N.A.	57	18
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1034-70/02

DAY OF MONTH	TOTAL INSOLATION BTU/SQ. FT	DIFFUSE INSOLATION BTU/SQ. FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	339	NOT	15	19	NOT	NOT	NOT
2	803		11	20			
3	511		20	18			
4	211		16	10*			
5	239		28	28			
6	1544		11	55			
7	1259		11	55			
8	1622		15	55			
9	1335		15	55			
10	1340		15	55			
11	2088		15	42			
12	1588		10	42			
13	1540		22	66			
14	1238		11	66			
15	1400		11	66			
16	632		16	23			
17	673		36	30			
18	1339		35	46			
19	1556		44	36			
20	244		32	32			
21	245		32	28			
22	1300		29	25			
23	1234		32	2			
24	1633						
SUM	22376	N.A.	-	-	-	-	-
AVG	799	N.A.	18	23	N.A.	N.A.	N.A.
NBS 10	Q001		N113		N115	N115	N114

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UNIVERSITY OF FLORIDA



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